THE AMERICAN MINERALOGIST
JOURNAL OF THE MINERALOGICAL SOCIETY OF AMERICA
VOL. 9 NOVEMBER, 1924 No. 11

THE CHRYSOBERYL PEGMATITE OF HARTFORD, MAINE

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Chrysoberyl of fine quality from several Maine localities has been in the hands of mineral collectors for several years past. Most of these specimens were obtained and distributed by Mr. Dudley of Buckfield, Maine, and the locality given by him was always Hartford. Other specimens, however, were labelled Sumner and Buckfield; but the appearance of all of these was sufficiently similar to make it seem probable, although not certain, that there was but one source. As no description of this notable occurrence seems to have been published, it appeared desirable to put on record observations made at the locality during a visit there in the summer of 1923; as well as a brief crystallographic description of the chrysoberyl.

On the Buckfield sheet of the U. S. G. S. topographic folio, in the center of the upper third of the sheet appears the name of Ragged Jack Mt., the southern end of a chain of hills trending from the northward. This summit is very nearly at the intersection of the town boundaries of Hartford, Sumner and Peru. The map shows by its contours a very steep cliff on the SW side of Ragged Jack Mt. and it is on the face of this cliff, in the town of Hartford, that the chrysoberyl occurs. The cliff is plainly visible from the road running north from Sumner to East Peru and may be reached by a walk of half a mile to the eastward across fields and wooded slopes. The dominating topographic feature of the region is Black Mt. which rises to the west of the valley in which the road lies.

On reaching the base of the cliff one finds a bold mass of granite rising almost vertically for 200 feet. The base is buried in a talus slope of very large blocks of granite, fallen from the ledge and piled confusedly, with many open spaces.

The pegmatite dike which is the source of the chrysoberyl traverses the face of the cliff in a diagonal direction and is well exposed in section. It is from 3 to 5 feet wide in its main extent and is 2 feet wide at the top of the cliff, but at the base it narrows to a few inches. Segments of the dike are seen in many of the fallen blocks and from these alone has the chrysoberyl been collected, the cliff face being too abrupt for foothold or attack.

The dike is largely composed of gray or milky quartz. Along the walls, however, some feldspar is developed in well formed and occasionally large individuals of unusual habit. Muscovite, black tourmaline, occasional garnet crystals, and chrysoberyl are the minor mineral constituents. They are very irregularly distributed in the dike and "like chrysoberyl" are found embedded both in quartz and feldspar. The quartz is unusually brittle, being apparently under pressure strain; and some chrysoberyl crystals show cracks and offsets with quartz infilling. The friable nature of the quartz is favorable to the collector; it generally breaks away readily and cleanly from the crystals of the other minerals.

Feldspar. The feldspar is oligoclase. It is sparingly present in the dike and was the first mineral to crystallize, forming the dike walls. Few crystals with definite form were obtained, but all are of the same habit. This is determined by the equant development of faces of the base, *c* (001), the brachypinacoid, *b* (010), and the macrodome, *y* ($\bar{2}01$) with extremely subordinate faces of *m* (110), and *o* (111). The effect is surprisingly cube-like; the largest crystal is effectively a cube measuring seven inches on an edge and quite unlike any crystal of feldspar before seen by the writer or any figured in Goldschmidt's Atlas. Study of cleavage fragments and powder in index fluids indicated a slightly calcic oligoclase. The feldspar is clear and glassy and shows few and very narrow albite twin-striae on the basal cleavage. The surfaces of the crystals are often coated with a film of muscovite. But one crystal of any other feldspar than oligoclase was found in the material collected; this proved to be microcline-microperthite.

Tourmaline. The black tourmaline is mostly in well developed crystals of which some are singly terminated, showing the common rhombohedral forms. Crystals as much as six inches in length were seen and from that they show every gradation to slender needles, but the mineral is not abundant in the dike. It contains quartz in places and muscovite but appears to have formed before the chrysoberyl since chrysoberyl is never included in it.

Garnet. The garnet appears to be an almandine, fairly bright red in color and crystallized in trapezohedrons. The largest crystal was less than one half an inch in diameter.

MUSCOVITE. Muscovite seems to be present in the rock in two generations. It is an original constituent of the pegmatite in well formed crystals embedded in quartz, in feldspar, and in tourmaline. In this form it is moderately abundant. It is also widely distributed as a secondary mineral coating joint surfaces of feldspar and the contact surfaces both of feldspar and chrysoberyl with quartz. Although described above as secondary, there is no certainty that it may not have been a later generation of mica of a primary character. The fact, however, that the rock has undergone some shearing and that some of the muscovite crystals are surrounded by a wreath of fine scaly muscovite similar to the coatings mentioned above, makes one suspect that it is of a secondary nature.

ZIRCON. Minute zircon crystals not to exceed 1/16 of an inch in length were observed sparsely distributed through the rock. They are embedded in part in the feldspar and in part in chrysoberyl. About a few of these minute crystals in chrysoberyl radiating cracks were observed forming a strain zone and suggesting the presence of radio-active constituents.

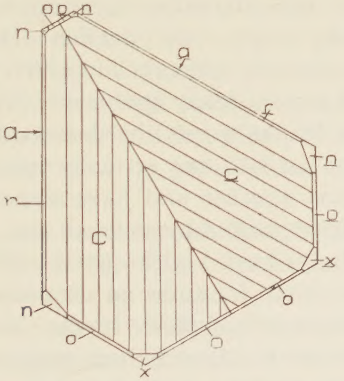

Fig. 1. Chrysoberyl. Twin on *r* (031). Projection on *a* (100). Drawn by M. N. Short

(*Errata:* In the above drawing for *a* and $\underline{a}$, read *b* and $\underline{b}$; for *c* and $\underline{c}$, read *a* and $\underline{a}$).

CHRYSOBERYL. Chrysoberyl is the most abundant constituent of the pegmatite aside from quartz and feldspar. Several hundreds of crystals are represented in the collections and they vary in size from plates up to two inches in diameter by a sixteenth of an inch in thickness to tiny scale-like crystals of extreme thinness. The vast majority of the crystals are twins consisting of two individuals in contact, generally very symmetrically developed. Very exceptional trilling crystals were observed and only two untwinned individuals were discovered in the whole collection. In these simple crystals the habit is prismatic with an almost square section determined by the front and side pinacoids. The twin crystals are always flattened parallel to the front pinacoid and generally form arrow shaped groups as shown in the drawing, Figure 1. The forms present are *a* (100), *b* (010), *s* (120), *x* (101), *i* (011), *o* (111), and *n* (121). The face *a*, as usual for this mineral, is deeply striated in the vertical direction. Other faces are apt to be dull, but crystals were obtained in which all the forms gave reflections on the goniometer. The twin plane is the general one for the mineral, (031). The color of the mineral is a pale wine yellow, and while most of the crystals have been more or less shattered by the movements that have effected the rock, a few of them are clear and beautifully transparent. Viewed in the direction of the brachypinacoid there is a pale bluish opalescence visible. The cleavage seems to be developed more distinctly parallel to the brachypinacoid than in any other direction. The shattering of the crystals due to movements in the rock in which they are embedded is characteristic of a great many specimens. The shattering takes the form of sharp breaks across the dominant pinacoid and the crystal may be broken into two or many fragments which lie at sharp angles to one another and have sometimes been moved laterally so as to be separated by as much as a quarter of an inch. The cracks are always healed with quartz. While the shattering generally produces clean fractures an occasional crystal shows a warping of its surface with invisible breaks, but this is to a slight degree only. Reference has already been made to the intimate way in which the surfaces of the crystals are coated with fine scaly muscovite. This does not appear to have been produced at the expense of the chrysoberyl, since where scraped away the faces are sharp and brilliantly reflecting, not etched.

ORDER OF CRYSTALLIZATION. The crystallization of the minerals of the pegmatite began with oligoclase and ended with quartz. All of the other minerals however, must have begun to crystallize before the feldspar ceased since all are found embedded in oligoclase. They, however, continue to appear after the beginning of quartz crystallization and the larger and better developed chrysoberyls especially are found embedded in quartz. Quartz, enormously the most abundant constituent of the dike, closed the period of crystallization leaving no cavities and forming, alone of all the minerals present, no free crystals.

CLINOZOISITE FROM LOWER CALIFORNIA[a]

AUSTIN F. ROGERS, *Stanford University*

The locality for the specimens described in this article is the Juarez District, Lower California, Mexico, about 65 miles south of the international boundary. The specimens were obtained from R. M. Wilke, mineral dealer of Palo Alto, California. The mineral is said to occur at the contact between a limestone and an igneous rock. It is probably the same locality that furnished the zoisite described by Farrington.[1]

The material at my disposal consists of five specimens including minerals associated with the clinozoisite. Two of them are pure clinozoisite, one of which is a rough euhedral crystal. Another specimen consists of pink and colorless zoisite (n about 1.710) in prismatic aggregates with an interior of gray clinozoisite, the two minerals apparently being in parallel position. This specimen resembles the material described by Farrington,[2] but the clinozoisite was evidently overlooked by him. The clinozoisite and zoisite may be distinguished by peculiarities in the interference colors as will be shown later.

In this specimen, and another somewhat similar one, the zoisite is embedded in a matrix of colorless prehnite. Farrington has suggested that the prehnite is the mineral analyzed by Schaller.[3]

The fifth specimen consists of slightly tapering and somewhat flattened prismatic aggregates of zoisite ($n = 1.707 \pm 003$). This is distinguished from the clinozoisite by both the index of refraction and interference colors.

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[a] Since this article has gone to press there has appeared in the *Am. Min.*, 9, p. 199, a paper by E. L. Bruce and C. W. Greenland on "A low iron epidote from Porcupine." It is quite likely that this is another occurrence of clinozoisite although no mention is made of anomalous interference colors.—EDITOR.

[1] FIELD COLUMBIAN MUSEUM. *Publication* 112, *Geol. Series*, III, 55-57, (1906).

[2] *Loc. cit.*

[3] *Bull.* 262, *U. S. Geol. Surv.*, p. 128 (1905).

Crystal Morphology. One of the specimens examined is a rather large (5×3×2 cm.) rough crystal of greenish gray color somewhat elongated in the direction of the *b*-axis as is usual with epidote. The forms present are $a\{100\}$, $c\{001\}$ and $f\{\bar{3}01\}$; the crystal is broken off where terminal faces might show. Measurements made with a contact goniometer gave the following: ac (100:001) = 63°40′ (calc. for epidote = 64°37′); $c\underline{c}$ (001:$\underline{001}$) = 52°0′ (calc. = 50°46). The average of three measurements of the angle af (100:$30\bar{1}$) made on a simple reflection goniometer[3a] gave 17°0′; the theoretical (for epidote) is 16°46′. As shown in ideal cross-section in Fig. 1 this crystal is a penetration-twin with $a\{100\}$ as twin-plane. Crushed fragments of the specimen used in the optical work examined between crossed nicols often show polysynthetic twinning.

There is perfect cleavage parallel to $c\{0C1\}$ as indicated in the drawing.

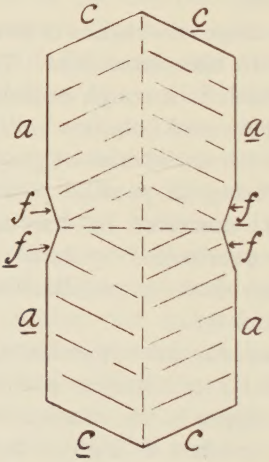

Fig. 1. Ideal cross-section of penetration twin of a clinozoisite crystal. $\underline{a}\{100\}$; $c\{001\}$; $\underline{f}\{\bar{3}01\}$. Twin-plane = $\{100\}$.

Optical Properties. The three principal indices of refraction of the clinozoisite as determined by the indirect immersion method are as follows: $n_\alpha = 1.715 \pm .001$; $n_\beta = 1.717. \pm 001$; $n_\gamma = 1.721 \pm .001$; $n_\gamma - n_\alpha = 0.006 \pm .002$. In these determinations a Wratten

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[3a] Described by the writer. *Science* (n.s.) **27**, 929, (1908).

E filter No. 22[4] was used to furnish an approximation to sodium light. Cleavage flakes (parallel to 001) in convergent light give a somewhat eccentric and slightly curved axial bar which means that the axial angle 2*V* is not far from 90°.

One of the prominent features of clinozoisite is the anomalous character of the interference colors as has been emphasized by Weinschenk.[5] In the specimen of clinozoisite from Lower California, the succession of interference colors observed in wedge-shaped fragments between crossed nicols is as follows: prussian blue, pale blue-gray, greenish yellow, pale red, red, violet blue, etc. The white of the first order is lacking. Another striking feature is that greenish yellow appears in place of bright yellow of the first order. These anomalous interference colors are somewhat different from those of zoisite. In zoisite there is a change in hue of interference color on rotation of the stage which is not true of the clinozoisite under examination.

SPECIFIC GRAVITY. The specific gravity of the analyzed clinozoisite determined on about 2 g. of carefully selected material by means of a pyknometer is 3.212.

CHEMICAL COMPOSITION. One of the specimens, a large rough mass free from associated minerals, was used for the chemical analysis. The color of this specimen is gray; in thin fragments it is almost colorless. It was the same specimen that was used for the optical determinations given above. The analysis was made by Mr. W. R. Waelty, one of my former students, with the following results:

ANALYSIS OF CLINOZOISITE BY W. R. WAELTY

	I	II	Av. I & II	Ratios	
SiO_2	37.85	37.77	37.81	.630	=6×.105
Al_2O_3	31.87	31.82	31.85	.312	=3×.110
Fe_2O_3	3.02	2.96	2.99	.019	
FeO	0.76	0.76	0.76	.010	=4×.111
CaO	24.27	24.44	24.36	.436	
MnO	tr.	tr.	tr.		
H_2O	2.29	2.21	2.25	.128	=1×.128
Total	100.06	99.96	100.02		

This is an iron-poor member of the epidote group with 6.8 per cent of the $Ca_2Fe_3(OH)(SiO_4)_3$ molecule.

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[4] Supplied by the Eastman Kodak Co.

[5] *Die gesteinsbildenden Mineralien*, p. 83, Freiburg, (1901).

The preceding analysis proves that the mineral is either clinozoisite or zoisite, which are dimorphous. The crystal form and optical properties taken together prove conclusively that the mineral is clinozoisite (Monoclinic). Zoisite is orthorhombic and has lower indices of refraction.

GENERAL REMARKS ON CLINOZOISITE. The only previously recorded clinozoisite from the North American continent, I believe, is the Huntington, Mass., mineral described by Forbes[6] as epidote ($Fe_2O_3 = 5.67$ per cent). In the same year Weinschenk[7] described minerals of the epidote group from Tyrol with still lower iron content and proposed the name *clinozoisite* for the iron-poor members of the group. Clinozoisite is dimorphous with zoisite. It is possible that clinozoisite is identical with the fouquéite from Ceylon and India described by Lacroix,[8] but until this is definitely proved the name clinozoisite may be retained.[9]

As has been shown by Forbes, Weinschenk, Thomas,[10] Goldschlag[11] and others, there is a continuous gradation between iron-free clinozoisite and iron-rich epidote (pistazite) with a corresponding variation in the optical properties. The correlation between the chemical composition and the various optical properties is not, however, very exact, probably on account of errors in some of the determinations.

It seems probable that clinozoisite is not such a very rare mineral; in thin sections I have frequently found a nearly colorless mineral resembling epidote but with lower birefringence which must be clinozoisite. It is a mineral which has probably been overlooked many times.

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[6] *Amer. Jour. Sci.*, 51, 26, (1896).

[7] *Zeit. f. Kryst.*, 26, 156-177, (1896).

[8] *Bull. soc. franc. min.* 12, 330, (1899).

[9] Lacroix in his *Mineralogie de la France* uses the name clinozoisite and not fouquéite.

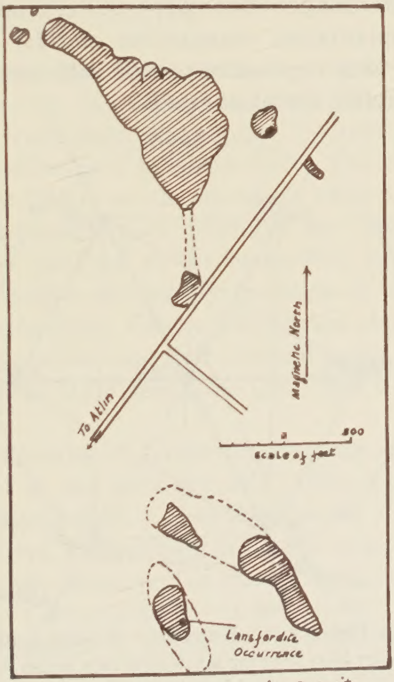
[10] *Mineral. Mag.*, 14 109-114, (1905).

[11] *Min. u. petr. Mitth.*, 34, 23-60, (1917).

A NEW OCCURRENCE OF LANSFORDITE FROM ATLIN, B. C.[a]

EUGENE POITEVIN, *Canada Geological Survey*.[b]

In 1915 Dr. G. A. Young of the Canadian Geological Survey, while making an examination of the hydromagnesite of Atlin,[1] collected some peculiar specimens of that mineral from a deposit located east of Atlin, figure 1. This deposit of hydromagnesite, which is the most southerly one, lies in a valley and has approximately one acre in area and from one to three feet in depth. According to Dr. Young the beds of that deposit are remarkably uniform in structure and composed of a fine powdery white hydromagnesite. The specimens of interest referred to above were



Atlin Hydromagnesite Deposits

Fig. 1.

(a) Published by permission of the Director, Geological Survey, Canada.

(b) Chief, Division of Mineralogy, Geological Survey, Canada.

[1] Summary report of the Geological Survey, Department of Mines, pp. 50-61, 1915.

obtained towards the bottom of the beds where, in places, the hydromagnesite forms a porous rock traversed by irregular vein-like films of a glassy, crystalline substance which also occurs lining cavities. This crystalline mineral was examined by R. A. A. Johnston who suggested that it was a basic hydrous magnesium carbonate.

Recently at the suggestion of Dr. Young the writer undertook the examination of a few specimens which had been collected and carefully placed in proper containers by the late Dr. D. D. Cairnes, to prevent any possible alteration. These specimens consist of a porous, semi-indurated white powdery hydromagnesite, the cavities of which are lined with thin films of translucent lansfordite. These films of lansfordite do not exceed one millimeter in thickness and, as a rule, are thinner. Enough partial crystals were gathered for a chemical qualitative examination and for crystallographic work but it has been impossible to find sufficient unaltered lansfordite for a complete chemical study.

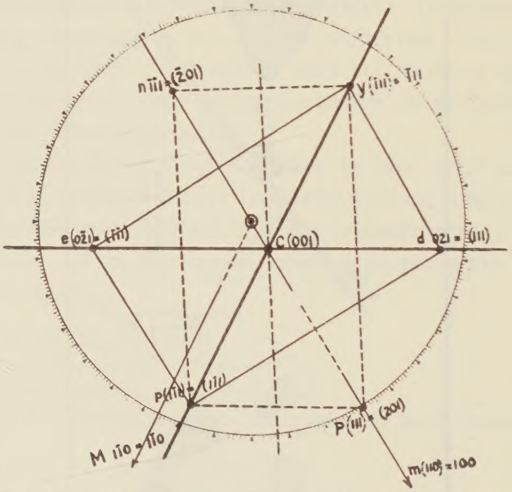


Fig. 2. Gnomonic Projection: *Dotted lines* showing lansfordite as a triclinic mineral (Penfield); *Heavy lines* showing lansfordite as a monoclinic mineral (Césaro and Poitevin).

Crystallography of Lansfordite. Measured on the two circle goniometer these very minute crystals were found to belong to the monoclinic system and at first were thought to be a new mineral. After a careful search of the literature dealing with basic hydrous magnesium carbonates and upon studying the figures given for lansfordite in Goldschmidt's Winkeltabellen, I found that the polar distance given for the base of lansfordite was exactly the same as that obtained for the Atlin crystals. The principal forms of lansfordite as given by Goldschmidt were then plotted, and as seen from the accompanying gnomonic projection, Penfield's triclinic lansfordite can be assigned to the monoclinic symmetry by simply making his unit prism *m* (110) become *a* (100). The lansfordite crystals from Atlin are simple in habit and resemble the one figured in Dana's textbook with the possible exception that they are stouter, owing to a smaller development of the prism zone. Using the orientation suggested above, goniometer measurements of the Atlin crystals yielded the following forms (100); (010); (120); (111); (101); (102); (302); (011); (321); (323); and (001).

Since completing the above work the writer came across an interesting paper by G. Césaro[2] entitled "Forme cristalline et composition du carbonate magnésique hydraté préparé par M. Moressée. Sa relation avec la lansfordite." This synthetic mineral is referred to by Césaro as the Moressée carbonate. Crystals of the Moressée carbonate were measured by Césaro on the goniometer and were assigned to the monoclinic system. Moreover their interfacial angles are exactly the same as those obtained by Penfield for lansfordite. Césaro also makes the suggestion that lansfordite is monoclinic and that Penfield's notation (110) should become (100); that (111) should be (201) and so on as suggested above.

OPTICAL PROPERTIES OF LANSFORDITE FROM ATLIN. The axial plane is parallel to the orthopinacoid (100). The basal cleavage shows in convergent light a beautiful biaxial figure. The acute bisectrix is positive with a moderate axial angle. The indices of refraction, carefully measured on fresh translucent crystals, were found to be: $\alpha = 1.456 \pm 0.001$; $\beta = 1.468 \pm 0.001$; $\gamma = 1.507 \pm 0.001$. Thus the birefringence is strong $(\gamma - \alpha) = .051$ while $(\gamma - \beta) = .039$ and $(\beta - \alpha) = .012$. The axial angle was measured in sodium light and found to be $2V = 59°30'$ while $2V$ calculated from the above indices $= 59°20'$.

OPTICAL PROPERTIES OF THE MORESSÉE CARBONATE. Césaro gives the following data: Axial plane || to $h' = (100)$; optically +;

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[2] Bulletin de la Classe des Sciences *Acad. Roy. de Belg.*, **1910**, No. 4, pages 234-265.

$\beta=1.470$. $2V$ measured 60°37′. The approximate birefringences are given as: $(\gamma-\alpha)=.051$; $(\gamma-\beta)=.038$; $(\beta-\alpha)=.013$.

Larsen[3] gives the following figures for lansfordite but does not mention where the specimens examined came from. $\alpha=1.46$; $\beta=1.47$; $\gamma=1.51$. $2V=61°$.

From the above notes there can be no doubt but that the Moressée carbonate is synthetic lansfordite.

CHEMICAL COMPOSITION OF LANSFORDITE. The Moressée carbonate or synthetic lansfordite which was ideal material for chemical work has been found by Césaro to have the following composition and formula.[4]

	PERCENT	RATIOS
MgO	22.80	0.570=1.00
CO_2	25.43	0.578=1.01
H_2O	51.77	2.876=5.05

Formula, $MgO.CO_2.5H_2O$

According to Césaro it seems that Genth and Penfield must have analyzed a lansfordite partially altered in order to obtain $4MgO. 3CO_2, 22H_2O$.

NOTES ON STILPNOMELANE

FRANK F. GROUT AND GEORGE A. THIEL, *University of Minnesota*

In connection with a study of the biotites of Minnesota, specimens of a dark brownish-green platy and bladed mineral were collected from the Animikian iron formations. There is a good exposure in veins in the Genoa pit on the Mesabi range. A similar mineral is found on the Cuyuna range in veins and throughout the gray-green carbonate slates; and elsewhere in the amphibole-magnetite slates.

In the veins the mineral forms plates and fibers with comb structures. (See fig. 1). In most of the veins it is associated with quartz and carbonate. Some of the larger veins, however, contain coarse euhedral apatite and a few grains of specular hematite.

In the slates the mineral occurs in the form of radiating or plumose groups and in the more schistose phases, the plates and fibers tend to follow the schistosity of the rock. Many of the magnetite slates are conspicuously banded with green bands, consisting almost entirely of radiating fibers and plates of the micaceous mineral and quartz.[1] Along brecciated zones in the slates many of the fragments are covered by a thin velvety coating that is apparently this same dark green to olive green mineral.

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[3] The Microscopic determination of the Nonopaque Minerals, p. 206.

[4] Césaro, loc. cit., p. 252.

The microscopic texture of many of the small veins indicates that much of the material in the veins was derived from fragments of the wall of the vein as the quartz crystallized. (See fig. 1). In others, however, the greenish-brown fibers that have crystallized in the fractures, are clearly precipitated from solution.

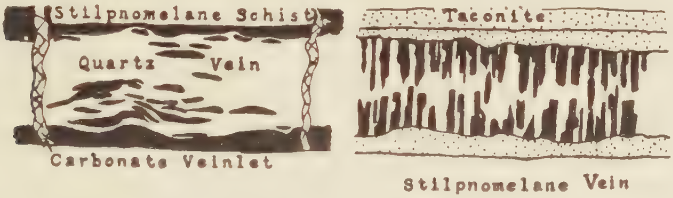

FIG. 1. Sketches showing the occurrence of stilpnomelane, (black) and quartz (white), in veins crossing stilpnomelane schist and taconite. Later carbonate veinlets cross the earlier vein. 2/3 Natural size.

The optical data resemble those for biotite; $2V$ very small, gamma $= 1.615 \pm 6$, alpha $= 1.546 \pm 4$. The indices, however, suggest a biotite with little iron, while the birefringence is that of a ferruginous biotite. A first analysis on carelessly separated material not only showed too much silica for biotite, but too little potash for a mixture of biotite and a little quartz; and the iron was too high for a biotite of the indices of refraction found. Carefully selected material was then crushed, and appeared under the microscope to be uniformly pure. The analysis, No. 2, is not that of a member of the biotite group. It resembles those of stilpnomelane, and chalcodite. Its higher potash and lower water are noteworthy, but the anlyses of stilpnomelane show so much variety that the identification is satisfactory. The specimens closely resemble museum specimens of stilpnomelane from Europe.

The occurrence of stilpnomelane elsewhere, (like that of the Minnesota mineral), is in veins in iron formations.[2] The development in wide-spreading slates in Minnesota, however, is somewhat different from the reported occurrence in altered diabase in eastern states. The green color is probably a sign of lack of much oxidation as suggested by Shannon. Its association in veins with apatite and specularite indicates that it forms at high temperature and at considerable depth.

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[1] These green banded slates have no doubt been in some cases mistaken for green amphibole rocks. Harder, E. C., and Johnston, A. W., The geology of east central Minnesota: *Minn. Geol. Survey, Bull.* 15, 117 (1918).

[2] Shannon, E. V., *Proc. U. S. Nat'l. Museum*, 57, 397, and 58, 451, (1921).

Analyses of Mineral from Veins on Mesabi Range

	1	1a	2	A	B	C	D
SiO_2	59.26	45.68	46.85	45.96	45.29	44.08	40.24
Al_2O_3	3.16	4.21	4.64	5.84	3.62	4.74	10.34
Fe_2O_3	8.99	11.99	11.60		20.47	5.27	24.57
FeO	14.65	19.53	20.00	35.60	16.47	23.31	5.21
MgO	4.66	6.21	5.75	1.78	4.56	8.36	6.78
CaO	1.42	1.89	0.94	.19	.28	Trace	...
Na_2O	.06	.08	.27	.....	.....	Trace	2.20
K_2O	1.89	2.52	2.07	.75	Trace	Trace	
H_2O+	4.36	5.81	5.77	8.63	9.22	10.28	7.63
H_2O-	1.00	1.33	1.80			2.21	3.03
TiO_2	.15	.20	.15				
MnO	n.d.	n.d.	.33			.87	
Cr_2O_3	Trace	Trace					
	99.60	99.45	100.17	98.75	99.91	99.82	100.00
Sp. G.			2.882	2.77 to 2.96	2.75		

1. Impure quartzose stilpnomelane from Mesabi range, Minn. F. F. Grout analyst.

1a. Analysis 1, recalculated, assuming about 25 per cent quartz impurity.

2. Pure micaceous stilpnomelane, Genoa pit, Mesabi range, Minn. F. F. Grout analyst.

A. Stilpnomelane, Obergrund. Dana's System of Mineralogy, p. 658.

B. Chalcodite, Sterling, N. Y., Brush, G. J.: *Am. Jour. Sci.*, **25**, 198 (1858).

C. Stilpnomelane, Westfield, Mass., Shannon Earl V.: *Proc. Nat. Mus.*, **58**, 453.

D. Stilpnomelane, Rocky Hill, N. J., Steiger, George: *Proc. Nat. Mus.*, **58**, 453.

The new analyses raise a question as to the classification and relationships of stilpnomelane. Dana's System of Mineralogy and Doelter's Mineralchemie list it in the midst of some chloritic minerals; and it has the green color and micaceous structure of that group. The composition, however, does not seem to relate it logically to any portion of the connected chlorite series. The work here done was incidental to a study of biotite and leads us to call attention to the peculiar features of the new chemical data. The analyses here made (and checked by independent laboratories), show less water and more potash than older analyses. To check our work, tests were made on stilpnomelane from Baern, Bohemia, found in our museum collection. It contains 2.62 per cent potash, a trace of soda, and about 43 per cent silica; it has $2V$ very small, gamma $= 1.677 \pm 4$; alpha $= 1.58 \pm 1$.

In both potash and water, therefore, some stilpnomelane resembles biotite almost as closely as it does chlorite. The optical characters, especially the birefringence, make it very difficult to distinguish from biotite. In many respects, then, stilpnomelane seems to be intermediate between chlorites and biotites, but perhaps it should be considered independently of either group.

PROCEEDINGS OF SOCIETIES

PHILADELPHIA MINERALOGICAL SOCIETY

Academy of Natural Sciences, September 11, 1924

A stated meeting of the Philadelphia Mineralogical Society was held on the above date with the vice-president, Mr. Trudell, in the chair. Twenty-nine members and three visitors were present.

Reports of summer trips constituted the program of the evening. The following local trips were reported, specimens being exhibited: Mr. Biernbaum, Avondale, Delaware County; Mr. Hoadley, New England and Canadian localities; Mr. Oldach, Worrall's farm, Delaware County, and the French Creek mines; Mr. Clay, Stockton, N. J.; Mr. Frankenfield, Moore, Delaware County; Mr. Warford, Moore, N. J.; Mr. Boyle, Moore, N. J., and Henderson, Penna.; Mr. Knabe, Howellville; Mr. Millson, Sterling Hill, N. J. Mr. Gordon reported a visit to the Ecton and Perkiomen mines, with Dr. Wills; linarite and aurichalcite in minute amount were found at the former locality.

Mr. Blank presented an account of a trip over the Fourth of July, to Franklin, N. J., and Branchville, Conn., taken by Messrs. Frankenfield, Biernbaum, Gordon, and himself. Considerable lithiophilite, spodumene, beryl, albite, and cyrtolite were found at Branchville. Considerable hancockite was found on the dumps of the Parker shaft at Franklin.

Mr. Oldach reported an excursion to the French Creek mines over Labor day, taken by Messrs. Biernbaum, Frankenfield, Faust, McClure, and Oldach. A specimen of brilliant magnetite crystals measuring 20×9 cm., with individual crystals measuring 15 mm. was found by Mr. Biernbaum.

Mr. Biernbaum described in detail an expedition to Nova Scotia, participated in also by Messrs. Frankenfield and Broadbelt, from July 2 th to August 10th. On the way, stops were made at the fibrous quartz locality at Providence, R. I., and the inyoite locality at Hillsboro, New Brunswick. The geology about Minas basin was briefly described, followed by details regarding the zeolite localities. The difficulties encountered owing to the high tides were vividly narrated. The following minerals were found: at Partridge Island: calcite, stilbite, heulandite, chabazite; Two Islands: heulandite, chabazite, gmelinite, and analcite; Wasson's Bluff: analcite, natrolite, chabazite, heulandite, and mesolite; Pinnacle Island: natrolite, gmelinite, and analcite; Cape Blomidon and Amethyst Cove: heulandite, analcite, stilbite, apophyllite, natrolite, quartz. Two maps, and a beautiful series of specimens were exhibited, noteworthy among which was a specimen of gmelinite crystals from Pinnacle Island collected by Mr. Frankenfield which measured 9×10 cm., the largest crystal of which measured 4.5 cm. across. At the conclusion of Mr. Biernbaum's communication, Mr. Frankenfield exhibited a series of lantern slides of photographs taken on the trip.

A very fine suite of radioactive minerals, including curite, kasolite, schoepite, chinkolobwite, becquerelite, soddite, parsonite, and dewindtite, from the Belgian Congo, were exhibited.

Samuel G. Gordon, *Secretary.*

ABSTRACTS

OPTICAL CHARACTERS OF CORDIERITE AFTER THE ACTION OF RADIUM RADIATIONS. O. Ansheles. *Bull. Sci. Inst., (P. F. Lesgaft)* 2, 132-40 (1920); thru *Mineral. Abstr.*, 2, 123-4.

New determinations have been made of the optical characters of cordierite both before and after a year's radiation by a Ra preparation. The changes so produced are analogous to those seen in natural pleochroic haloes in cordierite, only weaker, and support the author's theory that the haloes are of radioactive origin.

E. F. H.

CRYSTALS OF SILICATES IN THE DOLOMITES NEAR THE TOWN POVYENTZ. P. A. Borisov. *Bull. Acad. Sci. Russia*, 11, pt. 2, 1289-1314 (1917); thru *Mineral. Abstr.*, 2, 125-6.

The following minerals were found in dolomites from an island in Lake Onega. They are thought to be of hydrothermal origin, caused by a nearby mass of diorite. Microcline, cherry- to brownish-red crystals; orthoclase, sporadically as a new generation of idiomorphic crystals; albite crystals, red and pink and colorless in the pink dolomites; phlogopite crystals, non-pleochroic, very small optic axial angle; diopside; actinolite; isolated dolomite crystals. Analyses are given of albite, phlogopite, the dolomite rocks and the residue insoluble in HCl. E. F. H.

CRYSTALLOGRAPHIC AND OPTICAL STUDY OF THE CINNABAR OF AVALA. Stévanovich Svetolik. *Bull. soc. franc. mineral.*, 45, 134-61 (1922).

Forty-five cinnabar crystals from the mercury mine Suplja Stena, on the Avala mountain, near Belgrade, are shown. The crystals fall into four groups: (1) those with no trapezohedral or pyramidal faces to reveal their character; (2) those with right trapezohedrons and pyramids; (3) those with left; (4) twins of right and left together. The forms noted are: 39 rhombohedrons, 8 new; 20 bipyramids, + and –, 7 new; 57 + and − trapezohedrons, 11 new. Dextrogyrate crystals have their + trapezohedrons and pyramids on the right side of (211) or (100), their − forms on the right side of (211) or (221) [Miller's symbols]. E. F. H.

EXPERIMENTAL INVESTIGATIONS ON THE ROTATORY POWER OF CRYSTALLINE SUBSTANCES. L. LONGCHAMBON. *Bull. soc. franc. mineral.*, **45**, 161-252 (1922).

A method is described by which measurements of the rotation in biaxial crystals can be made with an error of only a few minutes. All crystalline substances examined which had a structural or molecular asymmetry were active, except several cubic crystals. An investigation of rotatory power is suggested as a sensitive physical method for furnishing evidence of asymmetry in crystalline structures when etch figures may fail. Numerical results for several biaxial minerals follow: epsomite, for $579\mu\mu$, 1.98; $546\mu\mu$, 2.30; $436\mu\mu$, 3.18; goslarite, 2.41, 2.72 and 4.05 respectively; morenosite, 6.1, 6.31 and —. E. F. H.

THE CORNETITE FROM BWANA MKUBWA (NORTHERN RHODESIA) AND THE FORMULA OF CORNETITE. G. CESÀRO. *Ann. Soc. géol. Belg.*, (*Bull.*), **45**, 102-8 (1922); thru *Rev. Géol.*, **4**, 20 (1923).

A basic Cu phosphate from northern Rhodesia, which was first described by Hutchinson and MacGregor, is identical with cornetite. C. arrives at the formula $Cu_2(PO_4)_2 . 3Cu(OH)_2$, corresponding to pseudomalachite. The xll'n varieties of pseudomalachite are, however, entirely different from cornetite. E. F. H.

ALBITE FROM KATANGA. G. CESÀRO AND M. BELLIÈRE. *Ann. Soc. géol. Belg.* (*Bull.*), **45**, 184-8 (1922); thru *Rev. Géol.*, **4**, 21 (1923).

The authors describe a curious rock composed essentially of albite imbedded in a yellowish-brown substance soluble in warm HCl; with small amounts of hematite, rubellite, and mica. E. F. H.

DIASPORE, LIBETHENITE, AND SEVERAL OTHER MINERALS FROM KATANGA. G. CESÀRO AND M. BELLIÈRE. *Ann. Soc. géol. Belg.* (*Bull.*), **45**, 172-81 (1922); thru *Rev. Géol.*, **4**, 21-2 (1923).

The following minerals occur at Lualaba hill: corundum; diaspore in platy xls.; white mica of two types, optically; rutile xls.; libethenite; and a pseudomalachite, probably of the composition $3Cu_3(PO_4)_2 + 8Cu(OH)_2$. E. F. H.

TWO ANCHIMONO-MINERAL FACIES OF THE WESTERN BOHEMIAN GABBRO. FRANTIŠEK SLAVÍK. *Rozpravy Ceské Akad.*, cl. **2**, **31**, no. 16, 6 pp. (1922); thru *Mineral Abstr.*, **2**, 118-9.

At Lhota, near Pocínovice, the normal gabbro is differentiated into rocks consisting almost entirely of a single mineral, as shown by the following analyses (Veselý): (1) ilmenite; (2) hortonolite.

	SiO_2	TiO_2	Al_2O_3	Fe_2O_3	FeO	MnO	MgO	CaO	Na_2O	K_2O	H_2O
1.	0.06	50.29	......	6.99	38.16	0.27	1.82	2.62	......	.....	.....
2.	29.08	3.16	3.28	5.00	44.58	0.40	11.95	0.76	0.64	0.18	0.39

The hortonolite is optically −, with $\rho > \nu$ and $n > 1.74$.

E. F. H.

THERMAL ANALYSIS AS A MEANS OF DETECTING KAOLINITE IN SOILS. JOSEF MATĚJKA. *Chem. Listy*, **16**, 8-14 (1922); thru *Mineral. Abstr.*, **2**, 131.

The presence and amount (down to 3%) of kaolinite in a soil can be determined from the dehydration diagram, since the dehydration curve of pure kaolinite has a characteristic break at 570-580°, which is not appreciably changed by the presence of quartz, orthoclase, calcite, or muscovite. But magnesite must previously be removed by HCL, as it affects the curve. E. F. H.

NOTES AND NEWS

Attention is called to the approaching annual meeting of The Mineralogical Society of America which will be held at Ithaca, New York, during the Christmas holidays; the exact date will be announced later. Attendance is urged to insure a large and successful meeting.

Dr. Kinosuke Inouye, director of the Imperial Geological Survey of Japan, has made an appeal for publications of a geological and mineralogical character to replace the periodicals destroyed by the recent earthquake and fire.

Models illustrating crystal structure, prepared under the direction of Professor A. Sommerfeld, may now be purchased through the Central Scientific Co., Chicago, Illinois. Models of rock salt, diamond, graphite, calcite, pyrite, rutile and anatase can be constructed immediately upon order. The list price is approximately $35 each, f.o.b. Chicago.

Professor W. A. Tarr, of the University of Missouri, will spend the coming year in Europe on sabbatical leave. He will continue his studies of stylolites and related features of sedimentary rocks as well as visit the more important mineral deposits.

Dr. Edmund Otis Hovey, curator of the department of geology and invertebrate paleontology of the American Museum of Natural History, and for many years secretary of the American Geological Society, died on September 26, aged sixty-two years.

Professor William J. Miller has resigned as head of the department of geology in Smith College to become professor of geology and chairman of the department in the University of California, Southern Branch, Los Angeles.

The new England Intercollegiate Geological Excursion was held in the vicinity of Brown University, Providence, October 10 and 11. The carboniferous series including the coal deposits were studied, also the metamorphic rocks, the shore lines and the glacial geology.